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will contact appear to form, whether a black drop is seen or not; but under no circumstances under which an actual transit is likely to be observed for parallax will it be really sudden. When it appears so it is only because the observer failed to notice the gradual darkening and breaking up of the thread of light. From the commencement of this darkening and diffusion, until the "apparent contact," which comes last of all, there are a series of progressive changes, which may extend over a period ranging anywhere from twenty or thirty to ninety seconds, at any point of which a random observation of internal contact may fall. The worse the definition, and the lower the planet, the greater the range; but the time of true contact is always near the mean of the period.

Washington,
1877, *February* 22.

Ephemeris for Physical Observations of Jupiter 1877.

By Mr. A. Marth.

Greenwich Noon. 1877.	Angle of position of ♃'s Axis.	Longitude of ♃'s Meridian directed to the Earth.	diff.	Latitude of Earth above ♃'s Equator.	Latitude of Sun above ♃'s Equator.	Annual Parallax.		Equatoreal Diameter.
	°	°	°	°	°	°	°	"
Mar. 31	357·72	104·8		−2·31	−2·45	−10·81		38·71
			4353·1				+ ·14	
Apr. 5	357·59	137·9		2·31	2·43	10·67		39·33
			3·2				·21	
10	357·51	171·1		2·30	2·42	10·46		39·96
			3·3				·29	
15	357·46	204·4		2·30	2·41	10·17		40·59
			3·3				·37	
20	357·44	237·7		2·29	2·39	9·80		41·22
			3·4				·45	
25	357·46	271·1		2·29	2·38	9·35		41·85
			3·5				·53	
30	357·52	304·6		2·29	2·37	8·82		42·46
			3·5				·61	
May 5	357·61	338·1		−2·28	−2·35	−8·21		43·04
			3·6				·67	
10	357·74	11·7		2·28	2·34	7·54		43·60
			3·6				·75	
15	357·90	45·3		2·28	2·32	6·79		44·13
			3·6				·82	
20	358·09	78·9		2·28	2·31	5·97		44·60
			3·7				·87	
25	358·31	112·6		2·28	2·30	5·10		45·03
			3·7				·93	
30	358·55	146·3		2·28	2·28	4·17		45·40
			3·7				·97	
June 4	358·82	180·0		−2·28	−2·27	−3·20		45·69
			3·7				1·01	
9	359·10	213·7		2·28	2·25	2·19		45·92
			3·7				1·03	

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Greenwich Noon. 1877.	Angle of position of ♃'s Axis.	Longitude of ♃'s Meridian directed to the Earth.	diff.	Latitude of Earth	Sun	Annual Parallax.		Equatoreal Diameter.
				above ♃'s Equator.				
	°	°	°	°	°	°	°	″
June 14	359·39	247·4		2·28	2·24	1·16		46·07
			3·7				1·04	
19	359·68	281·1		2·28	2·22	−0·12		46·14
			3·6				1·05	
24	359·98	314·7		2·28	2·21	+0·93		46·13
			3·6				1·04	
29	0·28	348·3		2·27	2·19	1·97		46·05
			3·5				1·01	
July 4	0·56	21·8		−2·27	−2·18	+2·98		45·88
			3·5				·99	
9	0·83	55·3		2·26	2·16	3·97		45·64
			3·4				·95	
14	1·08	88·7		2·26	2·15	4·92		45·33
			3·3				·89	
19	1·31	122·0		2·25	2·13	5·81		44·95
			3·2				·84	
24	1·51	155·2		2·24	2·12	6·65		44·52
			3·1				·77	
29	1·68	188·3		2·23	2·10	7·42		44·04
			3·1				·71	
Aug. 3	1·82	221·4		−2·22	−2·08	+8·13		43·53
			2·9				·64	
8	1·93	254·3		2·21	2·07	8·77		42·97
			2·8				·56	
13	2·00	287·1		2·20	2·05	9·33		42·40
			2·8				·48	
18	2·03	319·9		2·19	2·03	9·81		41·80
			2·6				·40	
23	2·03	352·5		2·18	2·02	10·21		41·20
			2·6				·33	
28	1·99	25·1		2·17	2·00	10·54		40·59
			2·5				·25	
Sept. 2	1·91	57·6		−2·15	−1·98	+10·79		39·98
			2·4				·17	
7	1·80	90·0		2·14	1·97	10·96		39·38
			2·3				·10	
12	1·66	122·3		2·12	1·95	11·06		38·78
			2·2				+ ·03	
17	1·48	154·5		2·11	1·93	11·09		38·20
			2·2				− ·04	
22	1·27	186·7		2·09	1·92	11·05		37·64
			2·1				·11	
27	1·03	218·8		2·07	1·90	10·94		37·10
			2·0				·17	
Oct. 2	0·76	250·8		−2·06	−1·88	+10·77		36·58
			2·0				·22	
7	0·46	282·8		2·04	1·86	10·55		36·08
			1·9				·28	
12	0·13	314·7		2·02	1·85	10·27		35·60
			4351·9				− ·34	
17	359·78	346·6		2·00	−1·83	9·93		35·15

Assumed daily rate of rotation 870°·60. The "annual parallax" is the difference of the Jovicentric longitudes of the Sun and Earth, reckoned in the plane of Jupiter's equator.

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The inclinations γ and the ascending nodes Γ of the orbits of the satellites in reference to the plane of *Jupiter's* equator are the following, the nodes being reckoned from the point of the vernal equinox of the planet:—

1877.	Sat. I.		Sat. II.		Sat. III.		Sat. IV.	
	γ_1	Γ_1	γ_2	Γ_2	γ_3	Γ_3	γ_4	Γ_4
	°	°	°	°	°	°	°	°
Mar. 1	0·0098	40·9	0·4510	49·52	0·1990	274·46	0·3298	330·54
Apr. 30	98	39·5	·4518	47·51	·1981	273·91	·3290	330·53
June 29	98	37·9	·4525	45·49	·1972	273·35	·3281	330·50
Aug. 28	98	36·2	·4532	43·47	·1964	272·80	·3274	330·45
Oct. 27	0·0098	34·5	0·4539	41·45	0·1956	272·24	0·3267	330·39

On Two Ancient Occultations of Planets by the Moon, observed by the Chinese. By J. R. Hind, F.R.S.

In the Appendix to the *Connaissance des Temps* for 1810 will be found a considerable number of observations taken from the Chinese astronomical records by the Jesuit missionary Gaubil, whose manuscript relative to the Chinese observations of comets was so much used by Pingré in the preparation of his *Cometographie.* Amongst the numerous occultations comprised in this list, there are two, and two only, in which the hour, or rather the particular two-hourly interval, at which the occultation took place is distinctly stated, and it is to these occultations that the present Note refers.

I have calculated the circumstances of these phenomena with the view to check a system of lunar motions previously applied in searching for the dates of several solar eclipses recorded on the Nineveh tablets, to which my attention had been directed by Mr. J. W. Bosanquet, and which, as compared with several historical total eclipses, of which the dates are well known, appeared to require but small modification. I have employed Damoiseau's Tables of 1824, adapting his main arguments to the results for secular motions &c. obtained by the Astronomer Royal from the discussion of the Greenwich lunar observations from 1750 to 1830, retaining the last values given by Hansen for terms depending on the square of centuries, which I had found to fit in best with the Greenwich motion proportional to time, at least as regards the secular acceleration. For the Sun and planets Le Verrier's Tables were adopted.

The earliest occultation recorded by Gaubil is one of the planet *Mars* by the Moon, and is thus translated:—

"Dynastie des Han occidentaux, la cour à Si-gan-fou du Chen-sy. An 69 (B.C) = 1re année *Ti-tsie*, 1re Lune, jour *vou-ou* (14 février) à la 2^{e} veille de 9 à 11 heures du soir, la Lune éclipsa *Mars*, entre les constellations *Kio* et *Kang*."